

IN THE CLAIMS

Please amend Claims 1, 2, 3, 4, 5, 6, 7, 8, 9, and 10 to read as follows.

1. (Currently Amended) An ink-jet recording process for conducting recording by ejecting a pigment ink and a reaction liquid containing a polyvalent metal salt from a recording section, in which a plurality of nozzles for ejecting the pigment ink and the reaction liquid are arranged, to a recording medium while relatively scanning the recording section to the recording medium, the process comprising the steps of:

ejecting the pigment ink having a surface tension lower than that of the reaction liquid to the reaction liquid ejected on the surface of the recording medium; and

forming, on the surface of the reaction liquid, a filmy aggregate by gathering of pigment agglomerates ~~at an interface where produced by contact between~~ the reaction liquid ~~has come into contact with~~ and the pigment ink,

wherein, in said forming step, the pigment agglomerates migrate on the surface of the reaction liquid toward a boundary between the reaction liquid and the recording medium, and the gathering of the pigment agglomerates is formed along the surface of the reaction liquid by the migration of the pigment agglomerates, and thereby the filmy aggregate is formed on the surface of the reaction liquid, and

wherein conditions for ejecting the reaction liquid in said ejecting step satisfy the relationship of

$$55 \times \frac{0.85 \times 10^6 \times Vd(pl)^{-0.61}}{Rx(dpi)Ry(dpi)} \leq duty(\%) \leq 125 \times \frac{0.85 \times 10^6 \times Vd(pl)^{-0.61}}{Rx(dpi)Ry(dpi)}$$

wherein Vd(pl) is an ejection volume per dot of the reaction liquid, Rx(dpi) is a recording resolution in the direction of the relative scanning, Ry(dpi) is a recording resolution in the arrangement direction of the nozzles, and duty(%) is a recording duty of the reaction liquid.

2. (Currently Amended) An ink-jet recording process for conducting recording by ejecting a pigment ink and a reaction liquid containing a polyvalent metal salt from a recording section, in which a plurality of nozzles for ejecting the pigment ink and the reaction liquid are arranged, to a recording medium while relatively scanning the recording section to the recording medium, the process comprising the steps of:

ejecting the pigment ink having a surface tension lower than that of the reaction liquid to the reaction liquid ejected on the surface of the recording medium; and

forming, on the surface of the reaction liquid, a filmy aggregate by gathering of pigment agglomerates at an interface where produced by contact between the reaction liquid ~~has come into contact with~~ and the pigment ink,

wherein, in said forming step, the pigment agglomerates migrate on the surface of the reaction liquid toward a boundary between the reaction liquid and the recording medium, and the gathering of the pigment agglomerates is formed along the

surface of the reaction liquid by the migration of the pigment agglomerates, and thereby the
filmy aggregate is formed on the surface of the reaction liquid, and

wherein conditions for ejecting the reaction liquid to a prescribed area on the recording medium when at least the recording duty of the ink in the prescribed area is 100% satisfy the relationship of

$$55 \times \frac{0.85 \times 10^6 \times Vd(pl)^{-0.61}}{Rx(dpi)Ry(dpi)} \leq duty(\%) \leq 125 \times \frac{0.85 \times 10^6 \times Vd(pl)^{-0.61}}{Rx(dpi)Ry(dpi)}$$

wherein Vd(pl) is an ejection volume per dot of the reaction liquid, Rx(dpi) is a recording resolution in the direction of the relative scanning, Ry(dpi) is a recording resolution in the arrangement direction of the nozzles, and duty(%) is a recording duty of the reaction liquid.

3. (Currently Amended) An ink-jet recording process for conducting recording on a recording medium by ejecting a pigment ink and a reaction liquid having a surface tension higher than that of the pigment ink and containing a polyvalent metal salt, which agglomerates the pigment ink, from a recording section, in which a plurality of nozzles for ejecting the pigment ink and the reaction liquid are arranged, to the recording medium while relatively scanning the recording section to the recording medium, the process comprising the steps of:

ejecting the reaction liquid to the recording medium; and

ejecting the pigment ink to the recording medium in such a manner that the pigment ink is brought into contact with the reaction liquid present in a liquid state on the surface of the recording medium,

wherein the pigment agglomerates, which are produced by contact between the reaction liquid and the pigment ink, migrate on the surface of the reaction liquid toward a boundary between the reaction liquid and the recording medium, and a series of the pigment agglomerates is formed along the surface of the reaction liquid by the migration of the pigment agglomerates, and thereby the filmy aggregate comprising the series of the pigment agglomerates is formed on the surface of the reaction liquid, and

wherein conditions for ejecting the reaction liquid in the ejection step satisfy the relationship of

$$55 \times \frac{0.85 \times 10^6 \times Vd(pl)^{-0.61}}{Rx(dpi)Ry(dpi)} \leq duty(\%) \leq 125 \times \frac{0.85 \times 10^6 \times Vd(pl)^{-0.61}}{Rx(dpi)Ry(dpi)}$$

wherein Vd(pl) is an ejection volume per dot of the reaction liquid, Rx(dpi) is a recording resolution in the direction of the relative scanning, Ry(dpi) is a recording resolution in the arrangement direction of the nozzles, and duty(%) is a recording duty of the reaction liquid.

4. (Currently Amended) An ink-jet recording process for conducting recording on a recording medium by ejecting a pigment ink and a reaction liquid having a

surface tension higher than that of the pigment ink and containing a polyvalent metal salt, which agglomerates the pigment ink, from a recording section, in which a plurality of nozzles for ejecting the pigment ink and the reaction liquid are arranged, to the recording medium while relatively scanning the recording section to the recording medium, the process comprising the steps of:

ejecting the reaction liquid to the recording medium; and

ejecting the pigment ink to the recording medium in such a manner that the pigment ink is brought into contact with the reaction liquid present in a liquid state on the surface of the recording medium,

wherein the pigment agglomerates, which are produced by contact between the reaction liquid and the pigment ink, migrate on the surface of the reaction liquid toward a boundary between the reaction liquid and the recording medium, and a series of the pigment agglomerates is formed along the surface of the reaction liquid by the migration of the pigment agglomerates, and thereby the filmy aggregate comprising the series of the pigment agglomerates is formed on the surface of the reaction liquid, and

wherein conditions for ejecting the reaction liquid to a prescribed area on the recording medium when at least the recording duty of the ink in the prescribed area is 100% satisfy the relationship of

$$55 \times \frac{0.85 \times 10^6 \times Vd(pl)^{-0.61}}{Rx(dpi)Ry(dpi)} \leq duty(\%) \leq 125 \times \frac{0.85 \times 10^6 \times Vd(pl)^{-0.61}}{Rx(dpi)Ry(dpi)}$$

wherein Vd(pl) is an ejection volume per dot of the reaction liquid, Rx(dpi) is a recording resolution in the direction of the relative scanning, Ry(dpi) is a recording resolution in the arrangement direction of the nozzles, and duty(%) is a recording duty of the reaction liquid.

5. (Currently Amended) An ink-jet recording process for conducting recording by ejecting a reaction liquid containing a polyvalent metal salt and a surfactant and a pigment ink containing a surfactant in a higher content than that of the reaction liquid to a recording medium from a recording section, in which a plurality of nozzles for ejecting the reaction liquid and the pigment ink are arranged, while relatively scanning the recording section to the recording medium, the process comprising the steps of:

bringing the pigment ink into contact with the reaction liquid present on the surface of the recording medium; and

forming, on the surface of the reaction liquid, a filmy aggregate by gathering of pigment agglomerates at the interface where produced by contact between the reaction liquid ~~has come into contact with~~ and the pigment ink,

wherein, in said forming step, the pigment agglomerates migrate on the surface of the reaction liquid toward a boundary between the reaction liquid and the

recording medium, and the gathering of the pigment agglomerates is formed along the surface of the reaction liquid by the migration of the pigment agglomerates, and thereby the filmy aggregate is formed on the surface of the reaction liquid, and

wherein conditions for ejecting the reaction liquid satisfy the relationship of

$$55 \times \frac{0.85 \times 10^6 \times Vd(pl)^{-0.61}}{Rx(dpi)Ry(dpi)} \leq duty(\%) \leq 125 \times \frac{0.85 \times 10^6 \times Vd(pl)^{-0.61}}{Rx(dpi)Ry(dpi)}$$

wherein Vd(pl) is an ejection volume per dot of the reaction liquid, Rx(dpi) is a recording resolution in the direction of the relative scanning, Ry(dpi) is a recording resolution in the arrangement direction of the nozzles, and duty(%) is a recording duty of the reaction liquid.

6. (Currently Amended) An ink-jet recording process for conducting recording by ejecting a reaction liquid containing a polyvalent metal salt and a surfactant and a pigment ink containing a surfactant in a higher content than that of the reaction liquid to a recording medium from a recording section, in which a plurality of nozzles for ejecting the reaction liquid and the pigment ink are arranged, while relatively scanning the recording section to the recording medium, the process comprising the steps of:

bringing the pigment ink into contact with the reaction liquid present on the surface of the recording medium; and

forming, on the surface of the reaction liquid, a filmy aggregate by gathering of pigment agglomerates at the interface where produced by contact between the reaction liquid ~~has come into contact with~~ and the pigment ink,

wherein, in said forming step, the pigment agglomerates migrate on the surface of the reaction liquid toward a boundary between the reaction liquid and the recording medium, and the gathering of the pigment agglomerates is formed along the surface of the reaction liquid by the migration of the pigment agglomerates, and thereby the filmy aggregate is formed on the surface of the reaction liquid, and

wherein conditions for ejecting the reaction liquid to a prescribed area on the recording medium when at least the recording duty of the ink in the prescribed area is 100% satisfy the relationship of

$$55 \times \frac{0.85 \times 10^6 \times Vd(pl)^{-0.61}}{Rx(dpi)Ry(dpi)} \leq duty(\%) \leq 125 \times \frac{0.85 \times 10^6 \times Vd(pl)^{-0.61}}{Rx(dpi)Ry(dpi)}$$

wherein Vd(pl) is an ejection volume per dot of the reaction liquid, Rx(dpi) is a recording resolution in the direction of the relative scanning, Ry(dpi) is a recording resolution in the arrangement direction of the nozzles, and duty(%) is a recording duty of the reaction liquid.

7. (Currently Amended) An ink-jet recording process for conducting recording by ejecting a reaction liquid containing a polyvalent metal salt and a pigment ink

having a surface tension lower than that of the reaction liquid to a recording medium in that order from a recording section, in which a plurality of nozzles for ejecting the reaction liquid and the pigment ink are arranged, while relatively scanning the recording section to the recording medium, the process comprising the steps of:

bringing the reaction liquid into contact with the pigment ink on the surface of the recording medium; and

forming, on the surface of the reaction liquid, a filmy aggregate by gathering of pigment agglomerates ~~at an interface where produced by contact between~~ the reaction liquid ~~has come into contact with~~ and the pigment ink; ~~and,~~

~~accelerating wherein~~ penetration of the reaction liquid ~~with respect to~~ into the recording medium is completed after the filmy aggregate is formed, and thereby the filmy aggregate covering a recessed portion between fibers of the recording medium is formed, and

wherein conditions for ejecting the reaction liquid satisfy the relationship of

$$55 \times \frac{0.85 \times 10^6 \times Vd(pl)^{-0.61}}{Rx(dpi)Ry(dpi)} \leq duty(\%) \leq 125 \times \frac{0.85 \times 10^6 \times Vd(pl)^{-0.61}}{Rx(dpi)Ry(dpi)}$$

wherein Vd(pl) is an ejection volume per dot of the reaction liquid, Rx(dpi) is a recording resolution in the direction of the relative scanning, Ry(dpi) is a recording resolution in the arrangement direction of the nozzles, and duty(%) is a recording duty of the reaction liquid.

8. (Currently Amended) An ink-jet recording process for conducting recording by ejecting a reaction liquid containing a polyvalent metal salt and a pigment ink having a surface tension lower than that of the reaction liquid to a recording medium in that order from a recording section, in which a plurality of nozzles for ejecting the reaction liquid and the pigment ink are arranged, while relatively scanning the recording section to the recording medium, the process comprising the steps of:

bringing the reaction liquid into contact with the pigment ink on the surface of the recording medium;

forming, on the surface of the reaction liquid, a filmy aggregate by gathering of pigment agglomerates ~~at an interface where~~ produced by contact between the reaction liquid ~~has come into contact with~~ and the pigment ink; ~~and,~~

~~accelerating~~ wherein penetration of the reaction liquid ~~with respect to~~ into the recording medium is completed after the filmy aggregate is formed, and thereby the filmy aggregate covering a recessed portion between fibers of the recording medium is formed, and

wherein conditions for ejecting the reaction liquid to a prescribed area on the recording medium when at least the recording duty of the ink in the prescribed area is 100% satisfy the relationship of

$$55 \times \frac{0.85 \times 10^6 \times Vd(pl)^{-0.61}}{Rx(dpi)Ry(dpi)} \leq duty(\%) \leq 125 \times \frac{0.85 \times 10^6 \times Vd(pl)^{-0.61}}{Rx(dpi)Ry(dpi)}$$

wherein Vd(pl) is an ejection volume per dot of the reaction liquid, Rx(dpi) is a recording resolution in the direction of the relative scanning, Ry(dpi) is a recording resolution in the arrangement direction of the nozzles, and duty(%) is a recording duty of the reaction liquid.

9. (Currently Amended) An ink-jet recording process for conducting recording on a recording medium by ejecting a pigment ink containing a surfactant and a reaction liquid containing a polyvalent metal salt, which agglomerates the pigment ink, from a recording section, in which a plurality of nozzles for ejecting the pigment ink and the reaction liquid are arranged, to the recording medium while relatively scanning the recording section to the recording medium, the process comprising the steps of:

ejecting the reaction liquid to the recording medium; and

ejecting the pigment ink to the recording medium in such a manner that the pigment ink is brought into contact with the reaction liquid present in a liquid state on the surface of the recording medium,

wherein the pigment agglomerates, which are produced by contact between the reaction liquid and the pigment ink, migrate on the surface of the reaction liquid toward a boundary between the reaction liquid and the recording medium, and a series of the pigment agglomerates is formed along the surface of the reaction liquid by the migration of

the pigment agglomerates, and thereby the filmy aggregate comprising the series of the pigment agglomerates is formed on the surface of the reaction liquid,

wherein the pigment ink contains the surfactant in a higher content than that in the reaction liquid, and

wherein conditions for ejecting the reaction liquid in the ejection step satisfy the relationship of

$$55 \times \frac{0.85 \times 10^6 \times Vd(pl)^{-0.61}}{Rx(dpi)Ry(dpi)} \leq duty(\%) \leq 125 \times \frac{0.85 \times 10^6 \times Vd(pl)^{-0.61}}{Rx(dpi)Ry(dpi)}$$

wherein Vd(pl) is an ejection volume per dot of the reaction liquid, Rx(dpi) is a recording resolution in the direction of the relative scanning, Ry(dpi) is a recording resolution in the arrangement direction of the nozzles, and duty(%) is a recording duty of the reaction liquid.

10. (Currently Amended) An ink-jet recording process for conducting recording on a recording medium by ejecting a pigment ink containing a surfactant and a reaction liquid containing a polyvalent metal salt, which agglomerates the pigment ink, from a recording section, in which a plurality of nozzles for ejecting the pigment ink and the reaction liquid are arranged, to the recording medium while relatively scanning the recording section to the recording medium, the process comprising the steps of:

ejecting the reaction liquid to the recording medium; and

ejecting the pigment ink to the recording medium in such a manner that the pigment ink is brought into contact with the reaction liquid present in a liquid state on the surface of the recording medium,

wherein the pigment agglomerates, which are produced by contact between the reaction liquid and the pigment ink, migrate on the surface of the reaction liquid toward a boundary between the reaction liquid and the recording medium, and a series of the pigment agglomerates is formed along the surface of the reaction liquid by the migration of the pigment agglomerates, and thereby the filmy aggregate comprising the series of the pigment agglomerates is formed on the surface of the reaction liquid,

wherein the pigment ink contains the surfactant in a higher content than that in the reaction liquid, and

wherein conditions for ejecting the reaction liquid to a prescribed area on the recording medium when at least the recording duty of the ink in the prescribed area is 100% satisfy the relationship of

$$55 \times \frac{0.85 \times 10^6 \times Vd(pl)^{-0.61}}{Rx(dpi)Ry(dpi)} \leq duty(\%) \leq 125 \times \frac{0.85 \times 10^6 \times Vd(pl)^{-0.61}}{Rx(dpi)Ry(dpi)}$$

wherein Vd(pl) is an ejection volume per dot of the reaction liquid, Rx(dpi) is a recording resolution in the direction of the relative scanning, Ry(dpi) is a recording resolution in the arrangement direction of the nozzles, and duty(%) is a recording duty of the reaction liquid.